

If your new procedure generates structured results, you will want to repeat the procedure before announcing them publicly. No matter how clear a pattern you obtained the first time, if attempts at replication fail, it is highly likely that the structure was merely a result of some unnoticed feature of the way you performed the procedure, not the underlying phenomenon. Likewise, if the pattern disappears with seemingly trivial variations in the procedure, that again points to the results being due to the procedure, not the underlying phenomenon. Moreover, if other researchers are not able to replicate your results, they will be suspicious that something unnoticed or unreported in your procedure was producing the result. (Suspensions do not always lead to a negative outcome. Researchers know it can be tricky to replicate results on a phenomenon that, though genuine and perhaps even important, is fragile or dependent on very particular circumstances. At the other extreme, thankfully rare, a result that is not replicated may turn out to have been fraudulent. Questions of the repeatability of results are not taken lightly in science and can take considerable time and effort to resolve.) Bearing in mind that adjudication is not always easy, we can summarize this first criterion as holding that results should exhibit a determinate pattern and be repeatable.

If your results survive this first test, your second step would likely involve comparing them to results obtained through older, already established techniques. This is akin to comparing a crime witness's account to that of other witnesses and other sources of evidence. When at least some aspects of the results produced by the new technique can be related to what was already known by other techniques, that does help establish the credibility of the new technique. This is a straightforward application of what William Whewell called the *consilience of induction*: "The consilience of Induction takes place when an Induction, obtained from one class of facts, coincides with an Induction obtained from another different class. This Consilience is a test of the truth of the theory in which it occurs" (1840, p. xxxix, Aphorism xiv).⁶

There are limitations on how far consistency can take investigators toward evaluating a new instrument. One limitation stems from the fact that the purpose of developing new instruments and techniques is to secure data about phenomena for which existing techniques are inadequate. This means that, for at least some cases in which you apply the new technique, there will be

⁶ Cytologist John Baker issued a particularly strong version of this requirement, insisting that all results with fixation of cells be compared to results from unfixed cells: "the only evidence of what is good or bad is comparison with the living cell. This point cannot be too strongly stressed: subjective ideas of what final result is good and what bad should never be allowed to form in the mind except on the solid ground of comparison with what is visible in the cell while still unaffected by reagents" (1942, p. 4. The passage is repeated in the second edition, 1950).